1652

#15

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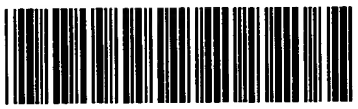

1600

RAW SEQUENCE LISTING
PATENT APPLICATION: US/09/441,313A

DATE: 06/04/2002
TIME: 14:46:21

Input Set : A:\5709 new seq list.ST25.txt
Output Set: N:\CRF3\06042002\I441313A.raw

p.6

ENTERED

<110> APPLICANT: Svendsen, Allan
Kjaerulff, Soren
Bisgard-Frantzen, Henrik
Andersen, Carsten
<120> TITLE OF INVENTION: Alpha-amylase variants
<130> FILE REFERENCE: 5709.200-US
<140> CURRENT APPLICATION NUMBER: US/09/441,313A
<141> CURRENT FILING DATE: 1999-11-16
<160> NUMBER OF SEQ ID NOS: 31
<170> SOFTWARE: PatentIn version 3.1
<210> SEQ ID NO: 1
<211> LENGTH: 485
<212> TYPE: PRT
<213> ORGANISM: Bacillus sp.
<400> SEQUENCE: 1

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Leu Pro Asn Asp Gly Asn His Trp Asn Arg Leu Arg Asp Asp Ala Ala
            20                  25                  30
Asn Leu Lys Ser Lys Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Trp
        35                  40                  45
Lys Gly Thr Ser Gln Asn Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr
    50                  55                  60
Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly
65                  70                  75                  80
Thr Arg Asn Gln Leu Gln Ala Ala Val Thr Ser Leu Lys Asn Asn Gly
                85                  90                  95
Ile Gln Val Tyr Gly Asp Val Val Met Asn His Lys Gly Gly Ala Asp
            100                 105                 110
Gly Thr Glu Ile Val Asn Ala Val Glu Val Asn Arg Ser Asn Arg Asn
        115                 120                 125
Gln Glu Thr Ser Gly Glu Tyr Ala Ile Glu Ala Trp Thr Lys Phe Asp
    130                 135                 140
Phe Pro Gly Arg Gly Asn Asn His Ser Ser Phe Lys Trp Arg Trp Tyr
145                 150                 155                 160
His Phe Asp Gly Thr Asp Trp Asp Gln Ser Arg Gln Leu Gln Asn Lys
                165                 170                 175
Ile Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp
            180                 185                 190
Thr Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Met
        195                 200                 205
Asp His Pro Glu Val Ile His Glu Leu Arg Asn Trp Gly Val Trp Tyr
    210                 215                 220
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RAW SEQUENCE LISTING DATE: 06/04/2002
PATENT APPLICATION: **US/09/441,313A** TIME: 14:46:21

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79 Thr Asn Thr Leu Asn Leu Asp Gly Phe Arg Ile Asp Ala Val Lys His
80 225                 230                 235                 240
83 Ile Lys Tyr Ser Phe Thr Arg Asp Trp Leu Thr His Val Arg Asn Thr
84                 245                 250                 255
87 Thr Gly Lys Pro Met Phe Ala Val Ala Glu Phe Trp Lys Asn Asp Leu
88             260                 265                 270
91 Gly Ala Ile Glu Asn Tyr Leu Asn Lys Thr Ser Trp Asn His Ser Val
92         275                 280                 285
95 Phe Asp Val Pro Leu His Tyr Asn Leu Tyr Asn Ala Ser Asn Ser Gly
96     290                 295                 300
99 Gly Tyr Tyr Asp Met Arg Asn Ile Leu Asn Gly Ser Val Val Gln Lys
100 305                 310                 315                 320
103 His Pro Thr His Ala Val Thr Phe Val Asp Asn His Asp Ser Gln Pro
104                 325                 330                 335
107 Gly Glu Ala Leu Glu Ser Phe Val Gln Gln Trp Phe Lys Pro Leu Ala
108             340                 345                 350
111 Tyr Ala Leu Val Leu Thr Arg Glu Gln Gly Tyr Pro Ser Val Phe Tyr
112         355                 360                 365
115 Gly Asp Tyr Tyr Gly Ile Pro Thr His Gly Val Pro Ala Met Lys Ser
116     370                 375                 380
119 Lys Ile Asp Pro Leu Leu Gln Ala Arg Gln Thr Phe Ala Tyr Gly Thr
120 385                 390                 395                 400
123 Gln His Asp Tyr Phe Asp His His Asp Ile Ile Gly Trp Thr Arg Glu
124                 405                 410                 415
127 Gly Asn Ser Ser His Pro Asn Ser Gly Leu Ala Thr Ile Met Ser Asp
128             420                 425                 430
131 Gly Pro Gly Gly Asn Lys Trp Met Tyr Val Gly Lys Asn Lys Ala Gly
132         435                 440                 445
135 Gln Val Trp Arg Asp Ile Thr Gly Asn Arg Thr Gly Thr Val Thr Ile
136     450                 455                 460
139 Asn Ala Asp Gly Trp Gly Asn Phe Ser Val Asn Gly Gly Ser Val Ser
140 465                 470                 475                 480
143 Val Trp Val Lys Gln
144                 485
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148 <211> LENGTH: 485
149 <212> TYPE: PRT
150 <213> ORGANISM: Bacillus sp.
152 <400> SEQUENCE: 2
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155 1               5                  10                  15
158 Leu Pro Asn Asp Gly Asn His Trp Asn Arg Leu Arg Asp Asp Ala Ser
159             20                  25                  30
162 Asn Leu Arg Asn Arg Gly Ile Thr Ala Ile Trp Ile Pro Pro Ala Trp
163         35                  40                  45
166 Lys Gly Thr Ser Gln Asn Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr
167     50                  55                  60
170 Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly
171 65                  70                  75                  80
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RAW SEQUENCE LISTING DATE: 06/04/2002
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174 Thr Arg Ser Gln Leu Glu Ser Ala Ile His Ala Leu Lys Asn Asn Gly
175                 85                  90                  95
178 Val Gln Val Tyr Gly Asp Val Val Met Asn His Lys Gly Gly Ala Asp
179             100                 105                 110
182 Ala Thr Glu Asn Val Leu Ala Val Glu Val Asn Pro Asn Asn Arg Asn
183         115                 120                 125
186 Gln Glu Ile Ser Gly Asp Tyr Thr Ile Glu Ala Trp Thr Lys Phe Asp
187     130                 135                 140
190 Phe Pro Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp Arg Trp Tyr
191 145                 150                 155                 160
194 His Phe Asp Gly Val Asp Trp Asp Gln Ser Arg Gln Phe Gln Asn Arg
195                 165                 170                 175
198 Ile Tyr Lys Phe Arg Gly Asp Gly Lys Ala Trp Asp Trp Glu Val Asp
199             180                 185                 190
202 Ser Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Met
203         195                 200                 205
206 Asp His Pro Glu Val Val Asn Glu Leu Arg Arg Trp Gly Glu Trp Tyr
207     210                 215                 220
210 Thr Asn Thr Leu Asn Leu Asp Gly Phe Arg Ile Asp Ala Val Lys His
211 225                 230                 235                 240
214 Ile Lys Tyr Ser Phe Thr Arg Asp Trp Leu Thr His Val Arg Asn Ala
215                 245                 250                 255
218 Thr Gly Lys Glu Met Phe Ala Val Ala Glu Phe Trp Lys Asn Asp Leu
219             260                 265                 270
222 Gly Ala Leu Glu Asn Tyr Leu Asn Lys Thr Asn Trp Asn His Ser Val
223         275                 280                 285
226 Phe Asp Val Pro Leu His Tyr Asn Leu Tyr Asn Ala Ser Asn Ser Gly
227     290                 295                 300
230 Gly Asn Tyr Asp Met Ala Lys Leu Leu Asn Gly Thr Val Val Gln Lys
231 305                 310                 315                 320
234 His Pro Met His Ala Val Thr Phe Val Asp Asn His Asp Ser Gln Pro
235                 325                 330                 335
238 Gly Glu Ser Leu Glu Ser Phe Val Gln Glu Trp Phe Lys Pro Leu Ala
239             340                 345                 350
242 Tyr Ala Leu Ile Leu Thr Arg Glu Gln Gly Tyr Pro Ser Val Phe Tyr
243         355                 360                 365
246 Gly Asp Tyr Tyr Gly Ile Pro Thr His Ser Val Pro Ala Met Lys Ala
247     370                 375                 380
250 Lys Ile Asp Pro Ile Leu Glu Ala Arg Gln Asn Phe Ala Tyr Gly Thr
251 385                 390                 395                 400
254 Gln His Asp Tyr Phe Asp His His Asn Ile Ile Gly Trp Thr Arg Glu
255                 405                 410                 415
258 Gly Asn Thr Thr His Pro Asn Ser Gly Leu Ala Thr Ile Met Ser Asp
259             420                 425                 430
262 Gly Pro Gly Gly Glu Lys Trp Met Tyr Val Gly Gln Asn Lys Ala Gly
263         435                 440                 445
266 Gln Val Trp His Asp Ile Thr Gly Asn Lys Pro Gly Thr Val Thr Ile
267     450                 455                 460
270 Asn Ala Asp Gly Trp Ala Asn Phe Ser Val Asn Gly Gly Ser Val Ser
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RAW SEQUENCE LISTING DATE: 06/04/2002
PATENT APPLICATION: US/09/441,313A TIME: 14:46:21

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Output Set: N:\CRF3\06042002\I441313A.raw

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274 Ile Trp Val Lys Arg
275                 485
278 <210> SEQ ID NO: 3
279 <211> LENGTH: 514
280 <212> TYPE: PRT
281 <213> ORGANISM: Bacillus stearothermophilus
283 <400> SEQUENCE: 3
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286 1               5                  10                  15
289 Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Glu Ala Asn Asn
290             20                  25                  30
293 Leu Ser Ser Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr Lys
294         35                  40                  45
297 Gly Thr Ser Arg Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr Asp
298     50                  55                  60
301 Leu Gly Glu Phe Asn Gln Lys Gly Ala Val Arg Thr Lys Tyr Gly Thr
302 65                  70                  75                  80
305 Lys Ala Gln Tyr Leu Gln Ala Ile Gln Ala Ala His Ala Ala Gly Met
306                 85                  90                  95
309 Gln Val Tyr Ala Asp Val Val Phe Asp His Lys Gly Gly Ala Asp Gly
310             100                 105                 110
313 Thr Glu Trp Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg Asn Gln
314         115                 120                 125
317 Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp Phe
318     130                 135                 140
321 Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr His
322 145                 150                 155                 160
325 Phe Asp Gly Val Asp Trp Asp Glu Ser Arg Lys Leu Ser Arg Ile Tyr
326                 165                 170                 175
329 Lys Phe Arg Gly Ile Gly Lys Ala Trp Asp Trp Glu Val Asp Thr Glu
330             180                 185                 190
333 Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met Asp His
334         195                 200                 205
337 Pro Glu Val Val Thr Glu Leu Lys Ser Trp Gly Lys Trp Tyr Val Asn
338     210                 215                 220
341 Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys
342 225                 230                 235                 240
345 Phe Ser Phe Phe Pro Asp Trp Leu Ser Asp Val Arg Ser Gln Thr Gly
346                 245                 250                 255
349 Lys Pro Leu Phe Thr Val Gly Glu Tyr Trp Ser Tyr Asp Ile Asn Lys
350             260                 265                 270
353 Leu His Asn Tyr Ile Met Lys Thr Asn Gly Thr Met Ser Leu Phe Asp
354         275                 280                 285
357 Ala Pro Leu His Asn Lys Phe Tyr Thr Ala Ser Lys Ser Gly Gly Thr
358     290                 295                 300
361 Phe Asp Met Arg Thr Leu Met Thr Asn Thr Leu Met Lys Asp Gln Pro
362 305                 310                 315                 320
365 Thr Leu Ala Val Thr Phe Val Asp Asn His Asp Thr Glu Pro Gly Gln
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RAW SEQUENCE LISTING DATE: 06/04/2002
PATENT APPLICATION: US/09/441,313A TIME: 14:46:21

Input Set : A:\5709 new seq list.ST25.txt
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```
366                 325                 330                 335
369 Ala Leu Gln Ser Trp Val Asp Pro Trp Phe Lys Pro Leu Ala Tyr Ala
370             340                 345                 350
373 Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly Asp
374         355                 360                 365
377 Tyr Tyr Gly Ile Pro Gln Tyr Asn Ile Pro Ser Leu Lys Ser Lys Ile
378     370                 375                 380
381 Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln His
382 385                 390                 395                 400
385 Asp Tyr Leu Asp His Ser Asp Ile Ile Gly Trp Thr Arg Glu Gly Val
386                 405                 410                 415
389 Thr Glu Lys Pro Gly Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro
390             420                 425                 430
393 Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly Lys Val
394         435                 440                 445
397 Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn Ser
398     450                 455                 460
401 Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Val Trp
402 465                 470                 475                 480
405 Val Pro Arg Lys Thr Thr Val Ser Thr Ile Ala Trp Ser Ile Thr Thr
406                 485                 490                 495
409 Arg Pro Trp Thr Asp Glu Phe Val Arg Trp Thr Glu Pro Arg Leu Val
410             500                 505                 510
413 Ala Trp
417 <210> SEQ ID NO: 4
418 <211> LENGTH: 483
419 <212> TYPE: PRT
420 <213> ORGANISM: Bacillus licheniformis
422 <400> SEQUENCE: 4
424 Ala Asn Leu Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro
425 1               5                   10                  15
428 Asn Asp Gly Gln His Trp Arg Arg Leu Gln Asn Asp Ser Ala Tyr Leu
429             20                  25                  30
432 Ala Glu His Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly
433         35                  40                  45
436 Thr Ser Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu
437     50                  55                  60
440 Gly Glu Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys
441 65                  70                  75                  80
444 Gly Glu Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn
445                 85                  90                  95
448 Val Tyr Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr
449             100                 105                 110
452 Glu Asp Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val
453         115                 120                 125
456 Ile Ser Gly Glu His Leu Ile Lys Ala Trp Thr His Phe His Phe Pro
457     130                 135                 140
460 Gly Arg Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe
461 145                 150                 155                 160
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RAW SEQUENCE LISTING ERROR SUMMARY DATE: 06/04/2002
PATENT APPLICATION: **US/09/441,313A** TIME: 14:46:22

Input Set : **A:\5709 new seq list.ST25.txt**
Output Set: **N:\CRF3\06042002\I441313A.raw**

Please Note:
Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

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Seq#:15; N Pos. 41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60
Seq#:15; N Pos. 61,62
Seq#:16; N Pos. 63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82
Seq#:16; N Pos. 83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101
Seq#:16; N Pos. 102,103,104
Seq#:17; N Pos. 19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38
Seq#:17; N Pos. 39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58
Seq#:17; N Pos. 59,60
Seq#:19; N Pos. 19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38
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